The retyped pages 14 and 34 of the clean copy of the substitue specification.

The surface of the fluid is confined to the surfaces of the solid elements. Therefore, the second term in the left side of Eq. (502) vanishes

$$\oint\!\!\oint_{S(t)} (\rho\vec{V}.d\vec{S})\vec{V} = 0 \tag{504}$$

Then summing the momentum Eq. (501) for all the solid elements with Eq. (502) for the fluid gives

$$\sum_{i=0}^{N} \frac{d}{dt}\vec{p}_i + \frac{\partial}{\partial t}\oint\!\!\oint\!\!\oint_{v(t)} \rho\vec{V}dv = \sum_{\substack{i,j=1\\ i\neq j}}^{N} \vec{F}_{ij} + \sum_{i=1}^{N} \vec{F}_i^{(p)} + \sum_{i=1}^{N} \vec{F}_i^{(\tau)} - \oint\!\!\oint_{S(t)} pd\vec{S} - \oint\!\!\oint_{S(t)} \vec{\tau}dS +$$

$$+\oint\!\!\oint\!\!\oint_{v(t)} \rho\vec{f}dv + \sum_{i=1}^{N} \vec{F}_i^{(e)} \tag{505}$$

Applying Newton's third law for interaction between the solid elements and their interaction with the fluid yields

$$\sum_{\substack{i,j=1\\ i\neq j}}^{N} \vec{F}_{ij} = 0 \tag{506}$$

$$\sum_{i=1}^{N} \vec{F}_i^{(p)} - \oint\!\!\oint_{S(t)} pd\vec{S} = 0 \tag{507}$$

and

$$\sum_{i=1}^{N} \vec{F}_i^{(\tau)} - \oint\!\!\oint_{S(t)} \vec{\tau}dS = 0 \tag{508}$$

Thus the momentum equation of the solid-fluid body must be written

$$\sum_{i=0}^{N} \frac{d}{dt}\vec{p}_i = -\frac{\partial}{\partial t}\oint\!\!\oint\!\!\oint_{v(t)} \rho\vec{V}dv + \oint\!\!\oint\!\!\oint_{v(t)} \rho\vec{f}dv + \sum_{i=1}^{N} \vec{F}_i^{(e)} \tag{509}$$

In Eq. (509) the term in the left side, which is the time rate of change of the total of the momentums of all the elements of the solid-fluid body in free space, must be equal to the total force acting on the solid-fluid body to accelerate it in free space; the second and third terms in the right side represent the total of external forces acting on the solid-fluid body. Therefore, the first term in the right side must be a force that the solid-fluid body acts on itself due to unsteady flow fluctuations of the fluid. We denote this force by $\vec{F}_s$, i.e.

$$\vec{F}_s = -\frac{\partial}{\partial t}\oint\!\!\oint\!\!\oint_{v(t)} \rho\vec{V}dv \tag{510}$$

chamber **172**. Rotor of blades **170** has a shaft **174**, which is supported for rotation by bearing supporters **176** and **178**. Bearing supporters **176** and **178** are secured to a structural frame **180** of mobile object **168**. Shaft **174** of rotor of blades **170** is operatively connected to an engine **182** by a gearbox **184**. A pump system **186** pressurizes a gas in generator chamber **172**. Pump system **186** is powered from engine **182**. Generator chamber **172** should be high enough such that the rotation of rotor **170** almost does not influence on the pressures at its ceiling and floor.

In operation, rotor of blades **170** is driven from engine **182** through gearbox **184**. Then the aerodynamic force or the lift created by rotor **170** can get a sufficiently large value due to the high pressure in generator chamber **172** and high angular velocity of rotor **170**. That force acts on the whole body of mobile object **168** through the shaft, mechanical joints, fasteners, supporters, and structural frame of the mobile object. Thus mobile object **168** generates its self-action force that also does not depend on the outer environment surrounding the mobile object. Mobile object **168** distinguishes from conventional helicopters by the independence of its self-action force from outer environment and the possibility of the operation of rotor **170** at high pressure that allows reducing the size of its blades and increasing its angular velocity.

We now apply the self-action principle presented earlier to the correct analysis of the dynamics of mobile object **168**.

Since the gas is compressible we write its equation in relative equilibrium in the form

$$\frac{dp}{dz} = -\frac{a}{RT}p \tag{573}$$

The solution of the equation is

$$p(z) = p_1 e^{-\frac{a}{RT}z} \tag{574}$$

where p_1 is the pressure of the gas on the floor of generator chamber **172**. If ρ_0 is the density of the gas at rest, then due to the conservation of mass we have

$$\rho_0 Al = \int_0^l A\rho(z)dz = \int_0^l \frac{Ap_1}{RT} e^{-\frac{a}{RT}z} dz = -\frac{Ap_1}{a}(e^{-\frac{a}{RT}l} - 1) \tag{575}$$

where l is the average height of generator chamber **172**. From Eq. (575) we have